

**WE CLAIM:**

1. A polymer prepared by polymerization of a monomer mixture, the mixture comprising:

(a) at least one first olefinic monomer containing an acetal or ketal linkage, the acid-catalyzed cleavage of which renders the polymer soluble in aqueous base; and

(b) at least one second olefinic monomer selected from (i) an olefinic monomer containing a pendant fluorinated hydroxyalkyl group  $R^H$ , (ii) an olefinic monomer containing a pendant fluorinated alkylsulfonamide group  $R^S$ , and (iii) combinations thereof.

2. The polymer of claim 1, wherein the acetal or ketal linkage is contained within an acid-cleavable substituent  $R^{CL}$  in the first olefinic monomer, the acid-cleavable substituent having the structure



in which:

m, n, and q are independently zero or 1;

$L^1$  is selected from  $C_1$ - $C_{12}$  alkylene, substituted  $C_1$ - $C_{12}$  alkylene,  $C_1$ - $C_{12}$  heteroalkylene, substituted  $C_1$ - $C_{12}$  heteroalkylene, and further wherein when  $L^1$  is optionally substituted and/or heteroatom-containing  $C_1$ - $C_{12}$  alkylene,  $L^1$  may be linear, branched, or cyclic;

X is selected from  $C_3$ - $C_{30}$  alicyclic and substituted  $C_3$ - $C_{30}$  alicyclic;

$L^2$  is selected from  $C_1$ - $C_{12}$  alkylene, substituted  $C_1$ - $C_{12}$  alkylene,  $C_1$ - $C_{12}$  heteroalkylene, substituted  $C_1$ - $C_{12}$  heteroalkylene, and further wherein when  $L^2$  is optionally substituted and/or heteroatom-containing  $C_3$ - $C_{12}$  alkylene,  $L^2$  may be linear, branched, or cyclic; and

$R^1$  is selected from acetal-containing and ketal-containing substituents.

3. The polymer of claim 2, wherein:

$L^1$  is selected from  $C_1$ - $C_{12}$  alkylene, and heteroatom-containing  $C_1$ - $C_{12}$  alkylene;

X is  $C_3$ - $C_{18}$  alicyclic;

$L^2$  is selected from  $C_1$ - $C_{12}$  alkylene, hydroxyl-substituted  $C_1$ - $C_{12}$  alkylene,  $C_1$ - $C_{12}$  fluoroalkylene, and hydroxyl-substituted  $C_1$ - $C_{12}$  fluoroalkylene; and

$R^1$  has the structure  $-(CO)-O-CR^4R^5-O-CR^6R^7R^8$  in which  $R^4$ ,  $R^5$ ,  $R^6$ ,  $R^7$ , and  $R^8$  are selected so as to render  $R^1$  acid-cleavable.

4. The polymer of claim 3, wherein:

$R^4$ ,  $R^5$ ,  $R^6$ ,  $R^7$ , and  $R^8$  are independently selected from hydrogen,  $C_4$ - $C_{12}$  hydrocarbyl, substituted  $C_4$ - $C_{12}$  hydrocarbyl, heteroatom-containing  $C_4$ - $C_{12}$  hydrocarbyl, and substituted heteroatom-containing  $C_4$ - $C_{12}$  hydrocarbyl, and further wherein any two of  $R^4$ ,  $R^5$ ,  $R^6$ ,  $R^7$ , and  $R^8$  may be linked to form a cyclic group.

5. The polymer of claim 4, wherein:

$L^1$  is selected from  $C_1$ - $C_{12}$  alkylene, and heteroatom-containing  $C_1$ - $C_{12}$  alkylene;

X is  $C_6$ - $C_{12}$  alicyclic; and

$L^2$  is of the formula  $-CR^9R^{10}-$  wherein  $R^9$  is hydrogen,  $C_1-C_{12}$  alkyl, or  $C_1-C_{12}$  fluoroalkyl, and  $R^{10}$  is  $C_1-C_{12}$  alkyl or  $C_1-C_{12}$  fluoroalkyl.

6. The polymer of claim 1, wherein the second olefinic monomer contains a pendant fluorinated hydroxyalkyl group  $R^H$ .

7. The polymer of claim 6, wherein  $R^H$  has the structure  $-L^3-CR^{11}R^{12}-OH$ , in which:  
 $L^3$  is selected from  $C_1-C_{12}$  alkylene, substituted  $C_1-C_{12}$  alkylene,  $C_1-C_{12}$  heteroalkylene, substituted  $C_1-C_{12}$  heteroalkylene,  $C_3-C_{15}$  alicyclic,  $C_3-C_{15}$  fluoroalicyclic, and combinations thereof;

$R^{11}$  is selected from hydrogen,  $C_1-C_{24}$  alkyl, and substituted  $C_1-C_{24}$  alkyl; and

$R^{12}$  is  $C_1-C_{24}$  alkyl or fluorinated  $C_1-C_{24}$  alkyl, with the proviso that at least one of  $R^{11}$  and  $R^{12}$  is fluorinated; and further wherein  $R^{11}$  and  $R^{12}$  can be taken together to form a ring.

8. The polymer of claim 7, wherein  $R^{11}$  is selected from hydrogen,  $C_1-C_{12}$  alkyl, and  $C_1-C_{12}$  haloalkyl, and  $R^{12}$  is  $C_1-C_{12}$  alkyl or fluorinated  $C_1-C_{12}$  alkyl.

9. The polymer of claim 8, wherein  $R^{11}$  is selected from hydrogen,  $C_1-C_8$  alkyl, and fluorinated  $C_1-C_8$  alkyl, and  $R^{12}$  is  $C_1-C_8$  alkyl or fluorinated  $C_1-C_8$  alkyl.

10. The polymer of claim 9, wherein  $R^{11}$  is selected from hydrogen,  $C_1-C_4$  alkyl, semi-fluorinated  $C_1-C_4$  alkyl, and perfluorinated  $C_1-C_4$  alkyl, and  $R^{12}$  is  $C_1-C_4$  alkyl, semi-fluorinated  $C_1-C_4$  alkyl, or perfluorinated  $C_1-C_4$  alkyl.

11. The polymer of claim 10, wherein  $R^{11}$  and  $R^{12}$  are both trifluoromethyl.

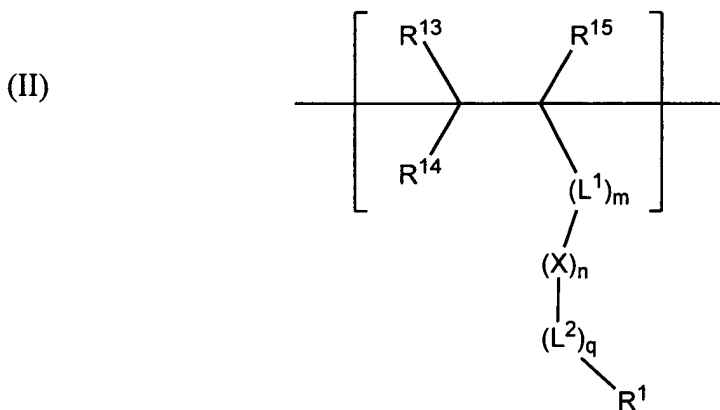
12. The polymer of claim 1, wherein the second olefinic monomer contains a pendant fluorinated alkylsulfonamide group  $R^S$ .

13. The polymer of claim 12, wherein  $R^S$  has the structure  $-L^3-SO_2-NHR^{16}$ , in which:

$L^3$  is selected from  $C_1$ - $C_{12}$  alkylene, substituted  $C_1$ - $C_{12}$  alkylene,  $C_1$ - $C_{12}$  heteroalkylene, substituted  $C_1$ - $C_{12}$  heteroalkylene,  $C_3$ - $C_{15}$  alicyclic,  $C_3$ - $C_{15}$  fluoroalicyclic, combinations thereof; and

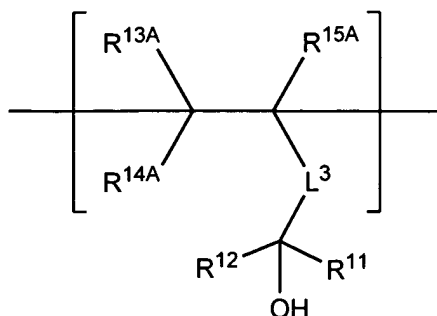
$R^{16}$  is selected from  $C_1$ - $C_{24}$  alkyl and substituted  $C_1$ - $C_{24}$  alkyl,  $C_1$ - $C_{24}$  fluoroalkyl and substituted  $C_1$ - $C_{24}$  fluoroalkyl.

14. A polymer comprising a first olefinic monomer unit having the structure of formula (II)



and a second olefinic monomer unit having the structure of formula (III)

(III)



wherein:

m, n, and q are independently zero or 1;

L<sup>1</sup> is selected from C<sub>1</sub>-C<sub>12</sub> alkylene, substituted C<sub>1</sub>-C<sub>12</sub> alkylene, C<sub>1</sub>-C<sub>12</sub> heteroalkylene, substituted C<sub>1</sub>-C<sub>12</sub> heteroalkylene, and further wherein when L<sup>1</sup> is optionally substituted and/or heteroatom-containing C<sub>1</sub>-C<sub>12</sub> alkylene, L<sup>1</sup> may be linear, branched, or cyclic;

X is selected from C<sub>3</sub>-C<sub>30</sub> alicyclic and substituted C<sub>3</sub>-C<sub>30</sub> alicyclic;

L<sup>2</sup> is selected from C<sub>1</sub>-C<sub>12</sub> alkylene, substituted C<sub>1</sub>-C<sub>12</sub> alkylene, C<sub>1</sub>-C<sub>12</sub> heteroalkylene, substituted C<sub>1</sub>-C<sub>12</sub> heteroalkylene, and further wherein when L<sup>2</sup> is optionally substituted and/or heteroatom-containing C<sub>3</sub>-C<sub>12</sub> alkylene, L<sup>2</sup> may be linear, branched, or cyclic; and

R<sup>1</sup> is selected from acetal-containing and ketal-containing substituents;

L<sup>3</sup> is selected from C<sub>1</sub>-C<sub>12</sub> alkylene, substituted C<sub>1</sub>-C<sub>12</sub> alkylene, C<sub>1</sub>-C<sub>12</sub> heteroalkylene, substituted C<sub>1</sub>-C<sub>12</sub> heteroalkylene, C<sub>3</sub>-C<sub>15</sub> alicyclic, C<sub>3</sub>-C<sub>15</sub> fluoroalicyclic, and combinations thereof;

R<sup>11</sup> is selected from hydrogen, C<sub>1</sub>-C<sub>24</sub> alkyl, and substituted C<sub>1</sub>-C<sub>24</sub> alkyl;

R<sup>12</sup> is C<sub>1</sub>-C<sub>24</sub> alkyl or fluorinated C<sub>1</sub>-C<sub>24</sub> alkyl, with the proviso that at least one of R<sup>11</sup> and R<sup>12</sup> is fluorinated; and further wherein R<sup>11</sup> and R<sup>12</sup> can be taken together to form a ring;

R<sup>13</sup> and R<sup>13A</sup> are independently selected from hydrogen, fluorine, C<sub>1</sub>-C<sub>24</sub> alkyl, substituted C<sub>1</sub>-C<sub>24</sub> alkyl, C<sub>1</sub>-C<sub>24</sub> alkoxy, and substituted C<sub>1</sub>-C<sub>24</sub> alkoxy; and

$R^{14}$  and  $R^{14A}$  are independently selected from hydrogen, fluorine,  $C_1$ - $C_{24}$  alkyl and substituted  $C_1$ - $C_{24}$  alkyl; and

$R^{15}$  and  $R^{15A}$  are independently selected from hydrogen, fluorine,  $C_1$ - $C_{24}$  alkyl, and substituted  $C_1$ - $C_{24}$  alkyl, and further wherein any two of  $L^1$ ,  $R^{13}$ ,  $R^{14}$ , and  $R^{15}$  may be taken together to form a ring and any two of  $L^3$ ,  $R^{13A}$ ,  $R^{14A}$ , and  $R^{15A}$  may be taken together to form a ring.

15. The polymer of claim 14, wherein

$L^1$  is selected from  $C_1$ - $C_{12}$  alkylene, and heteroatom-containing  $C_1$ - $C_{12}$  alkylene;

X is  $C_3$ - $C_{18}$  alicyclic;

$L^2$  is selected from  $C_1$ - $C_{12}$  alkylene, hydroxyl-substituted  $C_1$ - $C_{12}$  alkylene,  $C_1$ - $C_{12}$  fluoroalkylene, and hydroxyl-substituted  $C_1$ - $C_{12}$  fluoroalkylene;

$R^1$  has the structure  $-(CO)-O-CR^4R^5-O-CR^6R^7R^8$  in which  $R^4$ ,  $R^5$ ,  $R^6$ ,  $R^7$ , and  $R^8$  are selected so as to render  $R^1$  acid-cleavable;

$R^{11}$  is selected from hydrogen,  $C_1$ - $C_{12}$  alkyl, and  $C_1$ - $C_{12}$  haloalkyl; and

$R^{12}$  is  $C_1$ - $C_{12}$  alkyl or fluorinated  $C_1$ - $C_{12}$  alkyl; and further wherein  $R^{11}$  and  $R^{12}$  can be taken together to form a ring.

16. The polymer of claim 15, wherein

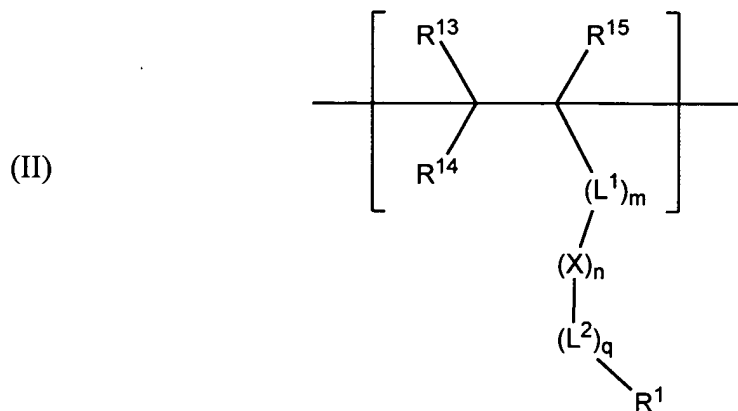
$R^4$ ,  $R^5$ ,  $R^6$ ,  $R^7$ , and  $R^8$  are independently selected from hydrogen,  $C_4$ - $C_{12}$  hydrocarbyl, substituted  $C_4$ - $C_{12}$  hydrocarbyl, heteroatom-containing  $C_4$ - $C_{12}$  hydrocarbyl, and substituted heteroatom-containing  $C_4$ - $C_{12}$  hydrocarbyl, and further wherein any two of  $R^4$ ,  $R^5$ ,  $R^6$ ,  $R^7$ , and  $R^8$  may be linked to form a cyclic group;

$R^{11}$  is selected from hydrogen,  $C_1$ - $C_8$  alkyl, and fluorinated  $C_1$ - $C_8$  alkyl; and  
 $R^{12}$  is  $C_1$ - $C_8$  alkyl or fluorinated  $C_1$ - $C_8$  alkyl; and further wherein  $R^{11}$  and  $R^{12}$  can be taken together to form a ring.

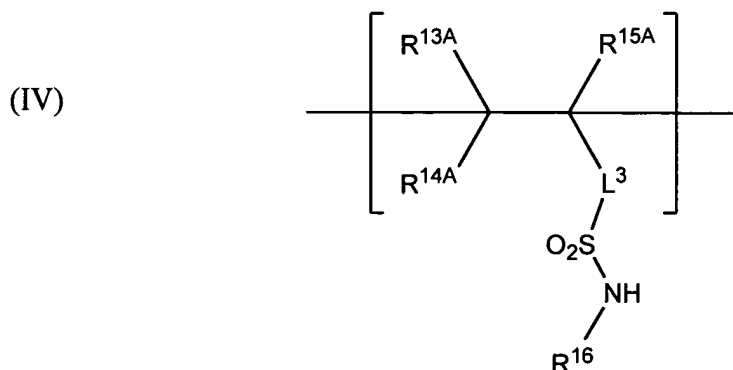
17. The polymer of claim 16, wherein  
 $L^1$  is selected from  $C_1$ - $C_6$  alkylene, and heteroatom-containing  $C_1$ - $C_6$  alkylene;  
 $X$  is  $C_6$ - $C_{12}$  alicyclic; and  
 $L^2$  is of the formula  $-CR^9R^{10}-$  wherein  $R^9$  is hydrogen,  $C_1$ - $C_{12}$  alkyl, or  $C_1$ - $C_{12}$  fluoroalkyl, and  $R^{10}$  is  $C_1$ - $C_{12}$  alkyl or  $C_1$ - $C_{12}$  fluoroalkyl;  
 $R^{11}$  is selected from hydrogen,  $C_1$ - $C_4$  alkyl, semi-fluorinated  $C_1$ - $C_4$  alkyl, and perfluorinated  $C_1$ - $C_4$  alkyl; and  
 $R^{12}$  is  $C_1$ - $C_4$  alkyl, semi-fluorinated  $C_1$ - $C_4$  alkyl, or perfluorinated  $C_1$ - $C_4$  alkyl.

18. The polymer of claim 17, wherein  $R^{11}$  and  $R^{12}$  are both trifluoromethyl.

19. A polymer comprising a first olefinic monomer unit having the structure of formula (II)



and a second olefinic monomer unit having the structure of formula (IV)



wherein:

m, n, and q are independently zero or 1;

$\text{L}^1$  is selected from  $\text{C}_1\text{-C}_{12}$  alkylene, substituted  $\text{C}_1\text{-C}_{12}$  alkylene,  $\text{C}_1\text{-C}_{12}$  heteroalkylene, substituted  $\text{C}_1\text{-C}_{12}$  heteroalkylene, and further wherein when  $\text{L}^1$  is optionally substituted and/or heteroatom-containing  $\text{C}_1\text{-C}_{12}$  alkylene,  $\text{L}^1$  may be linear, branched, or cyclic;

X is selected from  $\text{C}_3\text{-C}_{30}$  alicyclic and substituted  $\text{C}_3\text{-C}_{30}$  alicyclic;

$\text{L}^2$  is selected from  $\text{C}_1\text{-C}_{12}$  alkylene, substituted  $\text{C}_1\text{-C}_{12}$  alkylene,  $\text{C}_1\text{-C}_{12}$  heteroalkylene, substituted  $\text{C}_1\text{-C}_{12}$  heteroalkylene, and further wherein when  $\text{L}^2$  is optionally substituted and/or heteroatom-containing  $\text{C}_3\text{-C}_{12}$  alkylene,  $\text{L}^2$  may be linear, branched, or cyclic; and

$\text{R}^1$  is selected from acetal-containing and ketal-containing substituents;

$\text{L}^3$  is selected from  $\text{C}_1\text{-C}_{12}$  alkylene, substituted  $\text{C}_1\text{-C}_{12}$  alkylene,  $\text{C}_1\text{-C}_{12}$  heteroalkylene, substituted  $\text{C}_1\text{-C}_{12}$  heteroalkylene,  $\text{C}_3\text{-C}_{15}$  alicyclic,  $\text{C}_3\text{-C}_{15}$  fluoroalicyclic, and combinations thereof;

$\text{R}^{13}$  and  $\text{R}^{13\text{A}}$  are independently selected from hydrogen, fluorine,  $\text{C}_1\text{-C}_{24}$  alkyl, substituted  $\text{C}_1\text{-C}_{24}$  alkyl,  $\text{C}_1\text{-C}_{24}$  alkoxy, and substituted  $\text{C}_1\text{-C}_{24}$  alkoxy; and

$R^{14}$  and  $R^{14A}$  are independently selected from hydrogen, fluorine,  $C_1$ - $C_{24}$  alkyl and substituted  $C_1$ - $C_{24}$  alkyl;

$R^{15}$  and  $R^{15A}$  are independently selected from hydrogen, fluorine,  $C_1$ - $C_{24}$  alkyl, and substituted  $C_1$ - $C_{24}$  alkyl, and further wherein any two of  $L^1$ ,  $R^{13}$ ,  $R^{14}$ , and  $R^{15}$  may be taken together to form a ring and any two of  $L^3$ ,  $R^{13A}$ ,  $R^{14A}$ , and  $R^{15A}$  may be taken together to form a ring; and

$R^{16}$  is selected from  $C_1$ - $C_{24}$  alkyl and substituted  $C_1$ - $C_{24}$  alkyl,  $C_1$ - $C_{24}$  fluoroalkyl and substituted  $C_1$ - $C_{24}$  fluoroalkyl.

20. The polymer of claim 19, wherein:

$L^1$  is selected from  $C_1$ - $C_{12}$  alkylene, and heteroatom-containing  $C_1$ - $C_{12}$  alkylene;

X is  $C_3$ - $C_{18}$  alicyclic;

$L^2$  is selected from  $C_1$ - $C_{12}$  alkylene, hydroxyl-substituted  $C_1$ - $C_{12}$  alkylene,  $C_1$ - $C_{12}$  fluoroalkylene, and hydroxyl-substituted  $C_1$ - $C_{12}$  fluoroalkylene; and

$R^1$  has the structure  $-(CO)-O-CR^4R^5-O-CR^6R^7R^8$  in which  $R^4$ ,  $R^5$ ,  $R^6$ ,  $R^7$ , and  $R^8$  are selected so as to render  $R^1$  acid-cleavable.

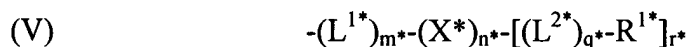
21. The polymer of claim 20, wherein

$R^4$ ,  $R^5$ ,  $R^6$ ,  $R^7$ , and  $R^8$  are independently selected from hydrogen,  $C_4$ - $C_{12}$  hydrocarbyl, substituted  $C_4$ - $C_{12}$  hydrocarbyl, heteroatom-containing  $C_4$ - $C_{12}$  hydrocarbyl, and substituted heteroatom-containing  $C_4$ - $C_{12}$  hydrocarbyl, and further wherein any two of  $R^4$ ,  $R^5$ ,  $R^6$ ,  $R^7$ , and  $R^8$  may be linked to form a cyclic group.

22. The polymer of claim 21, wherein  
L<sup>1</sup> is selected from C<sub>1</sub>-C<sub>6</sub> alkylene, and heteroatom-containing C<sub>1</sub>-C<sub>6</sub> alkylene;  
X is C<sub>6</sub>-C<sub>12</sub> alicyclic; and  
L<sup>2</sup> is of the formula -CR<sup>9</sup>R<sup>10</sup>-, wherein R<sup>9</sup> is hydrogen, C<sub>1</sub>-C<sub>12</sub> alkyl, or C<sub>1</sub>-C<sub>12</sub> fluoroalkyl, and R<sup>10</sup> is C<sub>1</sub>-C<sub>12</sub> alkyl or C<sub>1</sub>-C<sub>12</sub> fluoroalkyl.
23. The polymer of claim 1, wherein the monomer mixture comprises two or more different first olefinic monomers.
24. The polymer of claim 1, wherein the monomer mixture further comprises at least one additional olefinic monomer.
25. The polymer of claim 23, wherein monomer mixture further comprises at least one additional olefinic monomer.
26. The polymer of claim 24, wherein the at least one additional olefinic monomer is selected from (i) a monomer containing an acid-cleavable substituent R<sup>CL\*</sup>; (ii) a monomer containing an acid-inert, polar substituent, R<sup>P</sup>; (iii) a monomer containing an acid-inert, nonpolar substituent, R<sup>NP</sup>; and (iv) combinations thereof.
27. The polymer of claim 26, comprising monomer units substituted with R<sup>P</sup> and optionally R<sup>NP</sup>.

28. The polymer of claim 26, comprising monomer units substituted with  $R^{NP}$  and optionally  $R^P$ .

29. The polymer of claim 26, wherein  $R^{CL*}$  has the structure



in which:

$m^*$ ,  $n^*$ , and  $q^*$  are independently zero or 1;

$r^*$  is an integer of at least 1;

$L^{1*}$  is selected from  $C_1$ - $C_{12}$  alkylene, substituted  $C_1$ - $C_{12}$  alkylene,  $C_1$ - $C_{12}$  heteroalkylene, substituted  $C_1$ - $C_{12}$  heteroalkylene, and further wherein when  $L^{1*}$  is optionally substituted and/or heteroatom-containing  $C_1$ - $C_{12}$  alkylene,  $L^{1*}$  may be linear, branched, or cyclic;

$X^*$  is selected from  $C_3$ - $C_{30}$  alicyclic and substituted  $C_3$ - $C_{30}$  alicyclic;

$L^{2*}$  is selected from  $C_1$ - $C_{12}$  alkylene, substituted  $C_1$ - $C_{12}$  alkylene,  $C_1$ - $C_{12}$  heteroalkylene, substituted  $C_1$ - $C_{12}$  heteroalkylene, and further wherein when  $L^{2*}$  is optionally substituted and/or heteroatom-containing  $C_3$ - $C_{12}$  alkylene,  $L^{2*}$  may be linear, branched, or cyclic; and

$R^{1*}$  is selected from acid-cleavable ester, oligomeric ester, ether, carbonate, and orthoester substituents.

30. The polymer of claim 29, wherein:

$r^*$  is 1 or 2;

$L^{1*}$  is selected from  $C_1$ - $C_{12}$  alkylene, and heteroatom-containing  $C_1$ - $C_{12}$  alkylene;

$X^*$  is  $C_3$ - $C_{18}$  alicyclic;

$L^{2*}$  is selected from  $C_1$ - $C_{12}$  alkylene, hydroxyl-substituted  $C_1$ - $C_{12}$  alkylene,  $C_1$ - $C_{12}$  fluoroalkylene, and hydroxyl-substituted  $C_1$ - $C_{12}$  fluoroalkylene; and

$R^{1*}$  is selected from  $-(CO)-O-R^{4*}$ ,  $-[Q^{1*}-(CO)-O-]_{h^*}-R^{5*}$ ,  $-O-R^{6*}$ , and  $-O-(CO)-O-R^{7*}$ ;

$h^*$  is an integer in the range of 2 to 8 inclusive,

$Q^{1*}$  is  $C_1$ - $C_{12}$  alkylene or  $C_1$ - $C_{12}$  fluoroalkylene,

$R^{4*}$  and  $R^{6*}$  are selected from (a) hydrocarbyl substituents with a tertiary carbon attachment point, (b) substituents having the structure  $-CR^{8*}R^{9*}-O-CR^{10*}R^{11*}R^{12*}$ , and (c) substituents having the structure  $-CR^{13*}(OR^{14*})_2$ ;

$R^{5*}$ ,  $R^{7*}$ , and  $R^{14*}$  are selected from  $C_4$ - $C_{12}$  hydrocarbyl, substituted  $C_4$ - $C_{12}$  hydrocarbyl, heteroatom-containing  $C_4$ - $C_{12}$  hydrocarbyl, and substituted heteroatom-containing  $C_4$ - $C_{12}$  hydrocarbyl; and

$R^{8*}$ ,  $R^{9*}$ ,  $R^{10*}$ ,  $R^{11*}$ ,  $R^{12*}$ , and  $R^{13*}$  are independently selected from hydrogen,  $C_4$ - $C_{12}$  hydrocarbyl, substituted  $C_4$ - $C_{12}$  hydrocarbyl, heteroatom-containing  $C_4$ - $C_{12}$  hydrocarbyl, and substituted heteroatom-containing  $C_4$ - $C_{12}$  hydrocarbyl, and further wherein any two of  $R^{8*}$ ,  $R^{9*}$ ,  $R^{10*}$ ,  $R^{11*}$ , and  $R^{12*}$  may be linked to form a cyclic group.

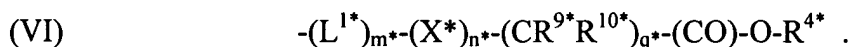
31. The polymer of claim 30, wherein:

$L^{1*}$  is selected from  $C_1$ - $C_6$  alkylene, and heteroatom-containing  $C_1$ - $C_6$  alkylene;

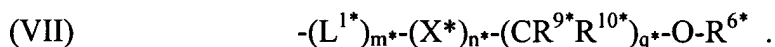
$X^*$  is  $C_6$ - $C_{12}$  alicyclic; and

$L^{2*}$  is of the formula  $-CR^{9*}R^{10*}-$ , wherein  $R^{9*}$  is hydrogen,  $C_1$ - $C_{12}$  alkyl, or  $C_1$ - $C_{12}$  fluoroalkyl, and  $R^{10*}$  is  $C_1$ - $C_{12}$  alkyl or  $C_1$ - $C_{12}$  fluoroalkyl.

32. The polymer of claim 31, wherein  $R^{1*}$  is of the formula  $-(CO)-O-R^{4*}$ , wherein  $R^{4*}$  is selected from cyclic and acyclic hydrocarbyl substituents with a tertiary carbon attachment point, such that when  $r^*$  is 1, then  $R^{CL*}$  has the structure



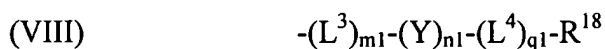
33. The polymer of claim 31, wherein  $R^{1*}$  is of the formula  $-O-R^{6*}$ , wherein  $R^{6*}$  is selected from cyclic and acyclic hydrocarbyl substituents with a tertiary carbon attachment point, such that when  $r^*$  is 1, then  $R^{CL*}$  has the structure



34. The polymer of claim 32, wherein  $R^{4*}$  is selected from t-butyl, 2-methyl-2-norbornyl, 2-methyl-2-adamantyl, 2-ethyl-2-adamantyl, isobornyl, 2-methyl-2-isobornyl, 2-methyl-2-tetracyclododecyl, 1-methylcyclohexyl, 1-ethylcyclohexyl, 1-butylcyclohexyl, 1-methylcyclopentyl, 1-ethylcyclopentyl, and 1-butylcyclopentyl.

35. The polymer of claim 33, wherein  $R^{6*}$  is selected from t-butyl, 2-methyl-2-norbornyl, 2-methyl-2-adamantyl, 2-ethyl-2-adamantyl, isobornyl, 2-methyl-2-isobornyl, 2-methyl-2-tetracyclododecyl, 1-methylcyclohexyl, 1-ethylcyclohexyl, 1-butylcyclohexyl, 1-methylcyclopentyl, 1-ethylcyclopentyl, and 1-butylcyclopentyl.

36. The polymer of claim 26, wherein R<sup>P</sup> has the structure



in which:

m1, n1, and q1 are independently zero or 1;

L<sup>3</sup> is selected from C<sub>1</sub>-C<sub>12</sub> alkylene, substituted C<sub>1</sub>-C<sub>12</sub> alkylene, C<sub>1</sub>-C<sub>12</sub> heteroalkylene, substituted C<sub>1</sub>-C<sub>12</sub> heteroalkylene, and further wherein when L<sup>3</sup> is optionally substituted and/or heteroatom-containing C<sub>1</sub>-C<sub>12</sub> alkylene, L<sup>1</sup> may be linear, branched, or cyclic;

Y is selected from C<sub>3</sub>-C<sub>30</sub> alicyclic and substituted C<sub>3</sub>-C<sub>30</sub> alicyclic;

L<sup>4</sup> is selected from C<sub>1</sub>-C<sub>12</sub> alkylene, substituted C<sub>1</sub>-C<sub>12</sub> alkylene, C<sub>1</sub>-C<sub>12</sub> heteroalkylene, substituted C<sub>1</sub>-C<sub>12</sub> heteroalkylene, and further wherein when L<sup>4</sup> is optionally substituted and/or heteroatom-containing C<sub>3</sub>-C<sub>12</sub> alkylene, L<sup>4</sup> may be linear, branched, or cyclic; and

R<sup>18</sup> is an acid-inert polar organic group containing a heteroatom with a Pauling electronegativity greater than about 3.00.

37. The polymer of claim 36, wherein:

L<sup>3</sup> is selected from C<sub>1</sub>-C<sub>12</sub> alkylene, and heteroatom-containing C<sub>1</sub>-C<sub>12</sub> alkylene;

Y is C<sub>3</sub>-C<sub>18</sub> alicyclic; and

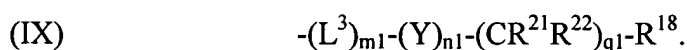
L<sup>4</sup> is selected from C<sub>1</sub>-C<sub>12</sub> alkylene, hydroxyl-substituted C<sub>1</sub>-C<sub>12</sub> alkylene, C<sub>1</sub>-C<sub>12</sub> fluoroalkylene, and hydroxyl-substituted C<sub>1</sub>-C<sub>12</sub> fluoroalkylene.

38. The polymer of claim 37, wherein:

$L^3$  is selected from  $C_1$ - $C_6$  alkylene, and heteroatom-containing  $C_1$ - $C_6$  alkylene;

$Y$  is  $C_6$ - $C_{12}$  alicyclic; and

$L^4$  is of the formula  $-CR^{21}CR^{22}-$  wherein  $R^{21}$  is hydrogen,  $C_1$ - $C_{12}$  alkyl, or  $C_1$ - $C_{12}$  fluoroalkyl, and  $R^{22}$  is  $C_1$ - $C_{12}$  alkyl or  $C_1$ - $C_{12}$  fluoroalkyl, such that  $R^P$  has the structure



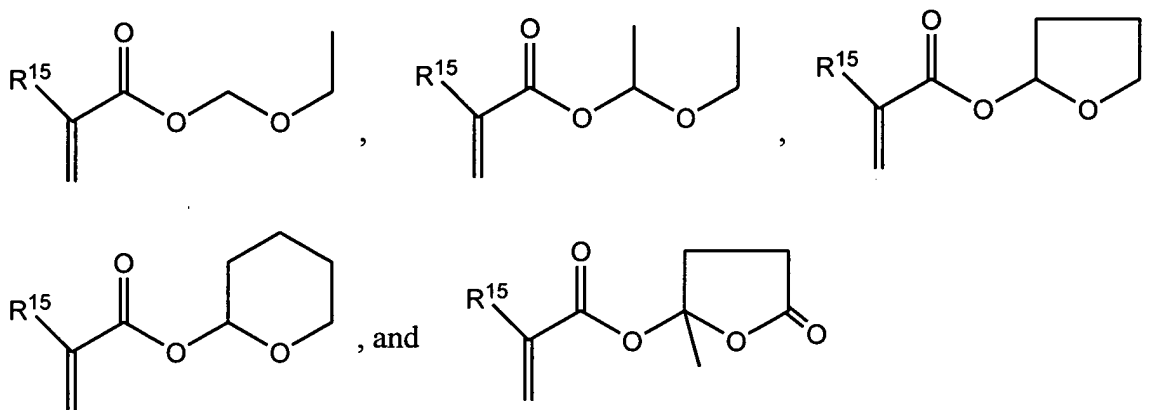
39. The polymer of claim 38, wherein the heteroatom within  $R^{18}$  is O or N.

40. The polymer of claim 39, wherein  $R^{18}$  is selected from hydroxyl, carboxyl,  $C_1$ - $C_{12}$  alkoxy,  $C_1$ - $C_{12}$  fluoroalkoxy, hydroxyl-substituted  $C_1$ - $C_{12}$  alkoxy, hydroxyl-substituted  $C_1$ - $C_{12}$  fluoroalkoxy,  $C_2$ - $C_{12}$  alkoxyalkyl, fluorinated  $C_2$ - $C_{12}$  alkoxyalkyl, hydroxyl-substituted  $C_2$ - $C_{12}$  alkoxyalkyl, fluorinated hydroxyl-substituted  $C_2$ - $C_{12}$  alkoxyalkyl, hydroxyl-substituted  $C_1$ - $C_{12}$  alkyl, hydroxyl-substituted  $C_1$ - $C_{12}$  fluoroalkyl, carboxyl-substituted  $C_1$ - $C_{12}$  alkyl, carboxyl-substituted  $C_1$ - $C_{12}$  fluoroalkyl,  $C_2$ - $C_{12}$  acyl, fluorinated  $C_2$ - $C_{12}$  acyl, hydroxyl-substituted  $C_2$ - $C_{12}$  acyl, fluorinated hydroxyl-substituted  $C_2$ - $C_{12}$  acyl,  $C_2$ - $C_{12}$  acyloxy, fluorinated  $C_2$ - $C_{12}$  acyloxy, hydroxyl-substituted  $C_2$ - $C_{12}$  acyloxy, fluorinated hydroxyl-substituted  $C_2$ - $C_{12}$  acyloxy, amino, mono- and di- $(C_1$ - $C_{12}$  alkyl)-substituted amino, amido, mono- and di- $(C_2$ - $C_{12}$  alkyl)amido, sulfonamido, N-heteroalicyclic, oxo-substituted N-heterocyclic, and, where the substituents permit, combinations of two or more of the foregoing.

41. The polymer of claim 26, wherein  $R^P$  is selected from lactone, anhydride, sulfonamide, fluoroalkanol, alkanol, alicyclic alkanol, esters, ethers, and a combination thereof.

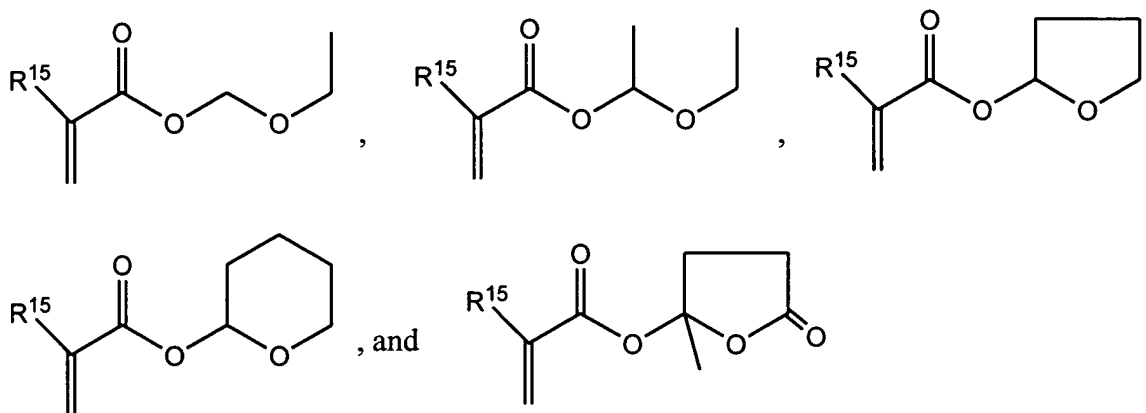
42. The polymer of claim 26, wherein  $R^{NP}$  is  $C_1$ - $C_{18}$  hydrocarbyl or fluorinated  $C_1$ - $C_{18}$  hydrocarbyl.

43. The polymer of claim 14, wherein the first olefinic monomer unit is derived from a monomer having a structure selected from the formulae



44. The polymer of claim 43, wherein  $R^{15}$  is selected from hydrogen, fluorine,  $C_1$ - $C_{24}$  alkyl, and fluorinated  $C_1$ - $C_{24}$  alkyl.

45. The polymer of claim 19, wherein the first olefinic monomer unit is derived from a monomer having a structure selected from the formulae



46. The polymer of claim 45, wherein R<sup>15</sup> is selected from hydrogen, fluorine, C<sub>1</sub>-C<sub>24</sub> alkyl, and fluorinated C<sub>1</sub>-C<sub>24</sub> alkyl.

47. A lithographic photoresist composition comprising the polymer of claim 1 and a photoacid generator.

48. The composition of claim 47, further comprising an additive selected from dissolution modifying additives, basic compounds, photospeed control agents, crosslinking agents, surfactants, adhesion promoters, and anti-foaming agents.

49. The composition of claim 48, wherein the dissolution modifying additive is a dissolution inhibitor.

50. The composition of claim 47, further comprising an additional polymer.

51. The composition of claim 50, wherein the polymer is selected from fluorine-containing polymers and non-fluorine-containing polymers.

52. The composition of claim 47, further comprising a solvent.

53. The composition of claim 47, wherein the photoacid generator is an onium salt selected from sulfonium salts and iodonium salts.

54. A lithographic photoresist composition comprising the polymer of claim 14 and a photoacid generator.

55. A lithographic photoresist composition comprising the polymer of claim 19 and a photoacid generator.

56. A polymer blend composition comprising the polymer of claim 1 and at least one additional polymer.